Visualizing Motion

One of the most effective methods of describing motion is to plot graphs of that motion. From such a graphical representation, it is possible to determine in what direction an object is going, how fast it is moving, how far it traveled, and whether it is speeding up or slowing down.

The Motion Detector measures the time it takes for a high frequency sound pulse to travel from the detector to an object and back. Using this round-trip time and the speed of sound, the software can calculate the distance to the object; that is, its position. In this activity, you will look at a graphical representation of the changes in position over time.



Figure 1

Objectives

In this activity, you will

1. Use a motion detector to create motion graphs.
2. Predict, graph, and test position *vs*. time graphs.

MATERIALS

|  |  |
| --- | --- |
| LabQuest Mini | Logger Pro Software |
| Motion Detector |  |

PROCEDURE

You will make motion graphs by moving towards or away from the motion detector in order to create position *vs*. time graphs that have specific shapes. For each trial, add a copy of your graph to this document and write a brief description of what motion was necessary to create the graph. To start data collection, click on the CollectNew button.

Data

Trial 1: A line with a positive slope

|  |
| --- |
| *Insert your graph* |
| **Describe the motion used to create this graph:** |

Trial 2: A line with a negative slope

|  |
| --- |
| *Insert your graph* |
| **Describe the motion used to create this graph:** |

Trail 3: A horizontal line

|  |
| --- |
| *Insert your graph* |
| **Describe the motion used to create this graph:** |

Trial 4: A graph with two linear sections with distinctly different positive slopes

|  |
| --- |
| *Insert your graph* |
| **Describe the motion used to create this graph:** |

Trial 5: A graph with two linear sections with distinctly different negative slopes

|  |
| --- |
| *Insert your graph* |
| **Describe the motion used to create this graph:** |

Trial 6: A graph with two linear sections with one section having a positive slope and one section having a negative slope

|  |
| --- |
| *Insert your graph* |
| **Describe the motion used to create this graph:** |

Apply your Learning

1. Describe how you should move to make the following position *vs*. time graph. Test your answer using a motion detector.

